SECTION 10: ADAPTATION

This Management Plan is meant to be a flexible tool to achieve water quality improvements within the Elkhart River Watershed. The WMP will be evaluated by assessing the progress made on each of the six goals. The evaluation and adaptation of the plan will be the responsibility of the ERA Steering Committee.

The plan should be evaluated every five years to assess the progress made as well as to revise the plan, if appropriate, based on the progress achieved. The plan will also have a comprehensive review every 15 years. Amendments and changes may be made more frequently as laws change or new information becomes available that will assist in providing a better outlook for the Elkhart River Watershed. As goals are accomplished and additional information is gathered, efforts may need to be shifted to watershed issues of higher priority.

GLOSSARY

Aquatic habitat: The lakes, streams and other watercourses in which an organism normally lives or occurs. A habitat includes both living and nonliving components. The habitat of an organism includes its sources of food and shelter.

Base flood elevation (BFE): The elevation delineating the level of flooding resulting from the 100-year flood frequency elevation. (See also Floodplain.)

Base flow: The flow that a perennially flowing stream reduces to during the dry season. It is supported by groundwater seepage into the channel.

Benthic: Bottom dwelling.

Best management practices (BMPs): Practices or programs that are used to prevent or ameliorate damage to natural resources, water quality or from flooding. Some BMPs used in urban areas may include stormwater detention ponds, restored wetlands, vegetative filter strips, porous pavement, silt fences and biotechnical streambank stabilization.

Biochemical oxygen demand (BOD): The amount of dissolved oxygen that is required by microscopic organism (e.g. bacteria) to decompose organic matter in waterbodies.

Biodiversity: The variety of organisms (plants, animals and other life forms) that includes the totality of genes, species and ecosystems in a region.

Bioengineering (or Soil Bioengineering): Also referred to as biotechnical slope protection. Techniques for stabilizing eroding or slumping stream banks that rely on the use of plants and plant materials such as live willow posts, brush layering, coconut logs and other "greener" or "softer" techniques. This is in contrast to techniques that rely on creating "hard" edges with riprap, concrete and sheet piling (metal and plastic).

Bio-infiltration (rain gardens): Excavated depressional areas where stormwater runoff is directed and allowed to infiltrate back into groundwater rather than allowing to runoff. . Infiltration areas are planted with appropriate vegetation. Rain gardens are especially suitable because they are aesthetically pleasing.

Buffer: An area of vegetated land to be left open adjacent to drainageways, wetlands, lakes, ponds or other such surface waters for the purpose of eliminating or minimizing adverse impacts to such areas from adjacent land areas.

Buffering Capacity: The waters ability to keep the pH stable as acids and bases are added to it.

Channel: Any river, stream, creek, brook, branch, natural or artificial depression, ponded area, lakes, flowage, slough, ditch, conduit, culvert, gully, ravine, swale, wash, or natural or man-made drainageway, in or into which surface or groundwater flows, either perennially or intermittently.

Channelized stream: A stream that has been artificially straightened, deepened, or widened to accommodate increased stormwater flows, to increase the amount of adjacent land that can be developed or used for urban development, agriculture or for navigation purposes. In addition to being unsightly, channelized streams have a uniform gradient, no riffle and pool development, no meanders (curves) and very steep banks. The vegetation is frequently removed and replaced with riprap, concrete or other hard surfaces. During low flow periods in the summer, many channelized streams have low dissolved oxygen levels, in part due to shallow, slow-moving water. Under these conditions, they provide poor habitat for fish or other stream organisms such as benthic macroinvertebrates.

Conservation development: A development designed to protect open space and natural resources for people and wildlife while at the same time allowing building to continue. Conservation design developments designate half or more of the buildable land area as undivided permanent open space.

Conservation easement: The transfer of landuse rights without the transfer of land ownership. Conservation easements can be attractive to property owners who do not want to sell their land at the present time, but would support perpetual protection from further development. Conservation easements can be donated or purchased.

Discharge (streamflow): The volume of water passing through a channel during a given time, usually measured in cubic feet per second.

Dissolved oxygen (DO): The amount of oxygen in water, usually measured in milligrams/liter.

Ecosystem: Combination of living things and the physical systems (geology, topography, moisture, climate, etc.) within which they must live.

EPT: The *Ephemeropteran*, *Plecopteran*, and *Trichopteran* orders

Erosion: Displacement of soil particles on the land surface due to water or wind action.

Evapotranspiration: The total water loss from a particular area, being the sum of evaporation from the soil and transpiration from vegetation.

Filter strip: A long narrow portion of vegetation used to retard water flow and collect sediment for the protection of watercourses, reservoirs, or adjacent properties.

Flood Insurance Rate Map (FIRM): A map prepared by the Federal Emergency Management Agency that depicts the special flood hazard area (SFHA) within a community. The FIRM includes

zones for the 100-year and 500-year floodplains and may or may not depict Regulatory Floodways.

Floodplain (100-year): Land adjoining the channel of a river, stream, watercourse, lake or wetland that has been or may be inundated by floodwater during periods of high water that exceed normal bank-full elevations. The 100-year floodplain has a probability of 1% chance per year of being flooded.

Geographic information system (GIS): A computer system that inputs, assembles, stores, manipulates and displays (usually in the form of maps) geographically referenced information.

Greenways: A protected linear open space area that is either landscaped or left in its natural condition. It may follow a natural feature of the landscape such as a river or stream, or it may occur along an unused railway line or some other right of way. Provides wildlife corridors and recreational trails.

Hydraulic structures: Low head dams, weirs, bridges, levees, and any other structures along the course of the river.

Hydric soil: A soil that is saturated, flooded or ponded long enough during the growing season to develop anaerobic conditions in the upper part of the soil profile.

Hydrologic soil groups: Soils are classified based on their infiltration and transmission rates into groups.

Illicit connections: Any discharge to a municipal separate storm sewer that is not composed entirely of stormwater, not due to fire fighting activities or stormwater discharged to a sanitary line.

Impervious surfaces: The land in a watershed, expressed in an area or percentage, covered by hard surfaces that prevent the infiltration of water into the soil. Impervious surfaces are the asphalt or concrete roads, parking lots, buildings, compacted lawns or other surfaces that are relatively impenetrable to the movement of water.

Index of Biotic Integrity (IBI): The IBI is based on fish surveys with the rating dependent on the abundance and composition of the fish species in a stream. Fish communities are useful for assessing stream quality because fish represent the upper level of the aquatic food chain and therefore reflect conditions in the lower levels of the food chain. Fish population characteristics are dependent on the physical habitat, hydrologic and chemical conditions of the stream, and are considered good indicators of overall stream quality because they reflect stress from both chemical pollution and habitat perturbations. For example, the presence of fish species that are intolerant of pollution are an indicator that water quality is good. The IBI is calculated on a scale of 12 to 60, the higher the score the better the stream quality.

Infiltration: That portion of rainfall or surface runoff that moves downward into the subsurface soil.

Invasive species: Species that are not native to an area and tend to out-compete native species and dominate an area.

Macroinvertebrate Index of Biotic Index (mIBI): IDEM's mIBI is a multi-metric index designed to provide a complete assessment of a stream's biological integrity. The mIBI is designed to assess biotic integrity directly through ten metrics which evaluate a macroinvertebrate community's species richness, evenness, composition, and density within the stream. These metrics include the family-level HBI (Hilsenhoff's Family Biotic Index), number of taxa, number of individuals, percent dominant taxa, EPT index, EPT count, EPT count to total number of individuals, EPT count to Chironomid count, Chironomid count, and number of individuals per number of squares sorted. Values for the ten metrics are compared with corresponding ranges and a rating of 0, 2, 4, 6, or 8 is assigned to each metric. The average of these ratings gives a total mIBI score.

Macroinvertebrates: Invertebrates that can be seen by the unaided eye (macro). Most benthic invertebrates in flowing water are aquatic insects or the aquatic stage of insects, such as stonefly nymphs, mayfly nymphs, caddisfly larvae, dragonfly nymphs and midge larvae. They also include such things as clams and worms. The presence of benthic macroinvertebrates that are intolerant of pollutants is a good indicator of good water quality.

Meander (stream): A sinuous channel form in flatter river grades formed by the erosion on one side of the channel (pools) and deposition on the other (point bars).

Mitigation: Measures taken to eliminate or minimize damage from development activities, such as construction in wetlands or Regulatory Floodplain filling, by replacement of the resource.

National Pollutant Discharge Elimination System (NPDES): Acronym for the National Pollutant Discharge Elimination System, which regulates point source and stormwater discharges.

Native vegetation: Plant species that have historically been found in an area.

Nonpoint source pollution: Refers to pollutants that accumulate in waterbodies from a variety of sources including runoff from the land, impervious surfaces, the drainage system and deposition of air pollutants.

Non-structural flood control: Practices including acquisition or relocation of floodprone buildings, floodproofing and use of runoff reduction techniques such as native landscaping.

Nutrients: Substances needed for the growth of aquatic plants and animals. The addition of too many nutrients (such as from sewage dumping and over fertilization) will cause problems in the aquatic ecosystem through excess algae growth and other nuisance vegetation.

Organic matter: Decomposing vegetative litter and animal matter.

Point Source: Refers to discharges from a single source such as an outfall pipe conveying wastewater from an industrial plant or wastewater treatment facility.

Pool: A location in an active stream channel usually located on the outside bends of meanders, where the water is deepest and has reduced current velocities.

Preventative measures: Actions that reduce the likelihood that new watershed problems such as flooding or pollution will arise, or that those existing problems will worsen. Preventative techniques generally target new development in the watershed and are geared toward protecting existing resources and preventing degradation.

Reach (Stream): A stream segment having fairly homogenous hydraulic, geomorphic and riparian cover and landuse characteristics (such as all ditched agriculture or all natural and wooded). Reaches generally should not exceed 2,000 feet in length.

Regulatory Floodplain: Regulatory Floodplains may be either riverine or non-riverine depressional areas. Projecting the base flood elevation onto the best available topography delineates floodplain boundaries. A flood-prone area is Regulatory Floodplain if it meets any of the following descriptions:

1. Any riverine area inundated by the base flood where there is at least 640 acres of tributary drainage area.
2. Any non-riverine area with a storage volume of 0.75 acre-foot or more when inundated by the base flood.
3. Any area indicated as a Special Flood Hazard Area on the FEMA Flood Insurance Rate Map and located with the best available topography to be inundated by the base flood.

Remedial measures: Used to solve known watershed problems or to improve current watershed conditions. Remedial measures include retrofitting drainage system infrastructure such as detention basins and storm sewer outfalls to improve water quality, adjust release rates, or reduce erosion.

Retrofit: Refers to modification of existing stormwater control structures such as detention basins and conveyance systems such as ditches and storm sewers. These structures were originally designed to improve drainage and reduce flood risk, but they can also be retrofitted to improve water quality. Seeks to improve existing problems.

Riffle: Shallow rapids, usually located at the crossover in a meander of the active channel.

Riparian: Referring to the riverside or riverine environment next to the stream channel, e.g., riparian, or streamside, vegetation.

Riverine: Relating to, formed by, or resembling a stream (including creeks and rivers).

Sediment: Soil particles that have been transported from their natural location by wind or water action.

Sedimentation: The process that deposits soils, debris, and other materials either on other ground surfaces or in bodies of water or watercourses.

Silt: Fine mineral particles intermediate in size between clay and sand.

Source reduction: Changing everyday practices to reduce the quantity of pollutants that end up on the land and in the water.

Steering Committee: An executive committee, which forms the core leadership and decision-making group of stakeholders in the watershed management practices and policies of the action plan.

Stormwater management: A set of actions taken to control stormwater runoff with the objectives of providing controlled surface drainage, flood control and pollutant reduction in runoff.

Stream monitoring: Chemical, biological and physical monitoring used to identify the causes and sources of pollution in the river and to determine the needs for reduction in pollutant loads, streambank stabilization, debris removal and habitat improvement.

Streambank stabilization: Techniques for stabilizing eroding or slumping streambanks to reduce erosion.

Structural flood control: Man-made reservoirs, levees, diversions or other structures that provide flood protection. Flood control measures are used to prevent floodwaters from reaching properties, thus preventing flood damage.

Substrate (stream): The composition of the bottom of a stream such clay, silt or sand.

Swale: A vegetated channel, ditch or low-lying or depressional tract of land that is periodically inundated by conveying stormwater from one point to another.

Total suspended solids (TSS): A measure of the particulate matter suspended in a water sample. Used to estimate sedimentation rates.

Trash rack: A barrier placed at the upstream end of a culvert to trap debris but allow water to flow through.

Turbidity: Refers to the clearness or clarity of the water, which is a function of how much material including sediment is suspended in the water.

Urban runoff: Water from rain or snow events that runs over surfaces such as streets, lawns, parking lots and directly into storm sewers before entering the river rather than infiltrating the land upon which it falls.

Velocity (of water in a stream): The distance that water can travel in a given direction during a period of time. Usually expressed in feet per second.

Watershed: An area confined by topographic divides that drains a given stream or river. The land area above a given point on a waterbody (river, stream, lake, wetland) that contributes runoff to that point is considered the watershed.

Watershed Stakeholder: A person who has a personal, professional, legal, or economic interest in the watershed and the outcome of the watershed planning process.

Wetland: A wetland is considered a subset of the definition of the Waters of the United States. Wetlands are land that is inundated or saturated by surface or ground water at a frequency and duration sufficient to support, under normal conditions, do support a prevalence of vegetation adapted for life in saturated soil conditions (known as hydrophytic vegetation). A wetland is identified based upon the three attributes: 1) hydrology, 2) hydric soils and 3) hydrophytic vegetation.

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ACRONYMS AND ABBREVIATIONS

A

AWRA- American Water Resources Association

B

BFE- Base Flood Elevation
BOD-Biochemical Oxygen Demand
BMP- Best Management Practices

C

CAP- Continuing Authorities Program
CFU- Colony Forming Units
CR- County Road
CREP- Conservation Reserve Enhancement Program
CRP- Conservation Reserve Program
CSOs- Combined Sewer Overflows
CWA- Clean Water Act
CWP- Center for Watershed Protection

D

DBMS- Database Management System
DO- Dissolved Oxygen

E

EPA- Environmental Protection Agency
EPT- Ephemeroptera (mayfly), Plecoptera (stonefly), and Tricoptera (caddisfly)
ERA- Elkhart River Alliance
ERRA- Elkhart River Restoration Alliance

F

FCA- Fish Consumption Advisory
FEMA- Federal Emergency Management Agency
FIRM- Flood Insurance Rate Maps
FOTG- Field Office Technical Guide

H

HBI- Hilsenhoff Biotic Index
HEL- Highly Erodible Land
HUC- Hydrologic Unit Code

I

IBI- Index of Biotic Integrity
IDEM- Indiana Department of Environmental Management
IDNR- Indiana Department of Natural Resources
ISDH- Indiana State Department of Health

L

LARE- Lake and River Enhancement
LTCP- Long Term Control Plan

M

MCTT- Multi-Chamber Treatment Train
MDEQ- Michigan Department of Environmental Quality
mg/L- milligrams per liter
mIBI- Macroinvertebrate Index of Biotic Integrity
MOS – Margin of Safety
MPN- most probable number

N

NGO- Non-Government Organization
NPDES- National Pollutant Discharge Elimination System
NPS- Nonpoint Source
NRCS- Natural Resource Conservation Service

P

Pb- Lead
PCBs- Polychlorinated Biphenyls
PRD- Planned Residential Developments
PUD- Planned Unit Developments

Q

QHEI- Qualitative Habitat Evaluation Index

S

SLHOA- Skinner Lake Home Owners Association
SR- State Road
STEPL- Spreadsheet Tool for Estimating Pollutant Load
SWCD- Soil & Water Conservation District

T

T&E- Threatened and Endangered

TKN- Total Kjeldahl Nitrogen
TMDL- Total Maximum Daily Load
TSS- Total Suspended Solids

U

ug/L- Micrograms per Liter
USACE- US Army Corps of Engineers
USDA-United States Department of Agriculture

W

WHIP- Wetland Habitat Incentive Program
WMP- Watershed Management Plan
WQS- Water Quality Standards
WRP- Wetland Reserve Program

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